

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended): A method for setting a color tone of a monochrome image, comprising the steps of:

(a) displaying a color tone setting window, using a graphical user interface module, for use in setting a color tone of a monochrome image, the color tone setting window including an ink color circle for specifying color component intensities representing three chromatic primary color inks with a single specified point therein; and

(b) determining the color component intensities representing the three chromatic primary color inks as parameters defining the color tone of the monochrome image in accordance with the position of a point specified in the ink color circle using a color tone determination module, wherein

the ink color circle is configured to enable the color component intensities representing the three chromatic primary color inks to be visually recognized from the position in the ink color circle,

an arbitrary point in the ink color circle is mapped to a corresponding point in an ink color triangle which is a hypothetical equilateral triangle corresponding to the ink color circle, the ink color triangle is an equilateral triangle having a common center with the ink color circle such that the color component intensities representing the three chromatic primary color inks at the corresponding point are determined in accordance with lengths of three lines drawn perpendicularly to three sides of the ink color triangle respectively from the corresponding point,

three vertices of the ink color triangle correspond to three chromatic primary colors of cyan, magenta, and yellow,

the ink color triangle circumscribes the ink color circle, ~~and~~

an arbitrary point in the ink color circle is mapped to a corresponding point in an inscribed circle of the ink color triangle, and

the corresponding point in the ink color triangle corresponding to an arbitrary point in the ink color circle is mapped such that the corresponding point is present on a straight line connecting the center of the ink color circle and the arbitrary point.

Claim 2 (Original): A method according to Claim 1, wherein the three chromatic primary color inks are cyan ink, magenta ink and yellow ink, which constitute output of a one-dimensional lookup table that is used for color conversion during printing of a monochrome image to obtain output of ink amounts for the plural ink colors in response to input of a lightness tone value of an image.

Claims 3 and 4 (Canceled).

Claim 5 (Currently Amended): A method according to ~~Claim 4~~ Claim 1, wherein a corresponding point in the ink color triangle corresponding to an arbitrary point on outer circumference of the ink color circle is mapped such that the corresponding point is present on a side of the ink color triangle.

Claim 6 (Original): A method according to Claim 5, wherein the center of the ink color circle expresses an achromatic color, and

the mapping has a non-linear conversion characteristic wherein change in the color component intensities representing the three chromatic primary color inks corresponding to change in position of a point decreases as the point becomes closer to the center of the ink color circle.

Claim 7 (Previously Presented): A method according to Claim 1, wherein the color tone setting window further includes a sample image display area for displaying a monochrome sample image, and

the step (b) includes a step of adjusting the color tone of the monochrome sample image based on the color component intensities representing the three chromatic primary color inks that are set using the ink color circle.

Claim 8 (Previously Presented): A method according to Claim 1, wherein the color tone setting window is able to display the ink color circle and color sliders.

Claim 9 (Original): A method according to Claim 8, wherein the color sliders include three ink color sliders used to set the color component intensities representing the three chromatic primary color inks.

Claim 10 (Previously Presented): A method according to Claim 8, wherein the color tone setting window includes a first window that has the ink color circle and a second window that has the color sliders such that the first and second windows are switched to be selectively displayed according to user selection.

Claim 11 (Original): A method according to Claim 10, wherein when the first window is switched to the second window according to user selection, the color tone specified via a specified point in the ink color circle is reflected and displayed on the color sliders.

Claim 12 (Original): A method according to Claim 11, wherein when the user instructs that the second window be switched to the first window, switching to the first window is prohibited and display of the second screen is maintained, or a warning display is issued indicating that the attempted switch to the first window is invalid.

Claim 13 (Previously Presented): A method according to Claim 8, wherein the color tone setting window has buttons to set multiple basic color tones, such that when a user selects one basic color tone, the specified point in the ink color circle and slider positions of the color sliders are displayed at a position indicating the selected basic tone.

Claim 14 (Previously Presented): A method according to Claim 1, further comprising the steps of:

(c) providing a reference one-dimensional lookup table that inputs an image lightness tone value and outputs ink amounts for plural types of ink including multiple chromatic inks; and

(d) generating a printing-use one-dimensional lookup table for use in printing of a monochrome image by adjusting amounts of the multiple chromatic inks in the reference one-dimensional lookup table in accordance with the color component intensities representing the three chromatic primary color inks determined in the step (b).

Claim 15 (Original): A method according to Claim 14, wherein multiple inks having different concentrations of identical color component are usable, and ink amounts of the multiple different-concentration inks are adjusted using an identical color component intensity value.

Claim 16 (Previously Presented): A method according to Claim 1, further comprising the steps of:

determining an ink amount adjustment value for each color component based on the intensity value for each color component; and

adjusting an ink amount for each color component using the ink amount adjustment value for each color component,

wherein relationship between the intensity value of each color component and the ink amount adjustment value for each color component is established independently for each color component.

Claim 17 (Canceled).

Claim 18 (Currently Amended): An apparatus for setting a color tone of a monochrome image, comprising:

a user interface module configured to display a color tone setting window for use in setting a color tone of a monochrome image, the color tone setting window including an ink color circle or an ink color triangle for specifying color component intensities representing three chromatic primary color inks with a single specified point; and

a color tone determining module configured to determine the color component intensities representing the three chromatic primary color inks as parameters defining the color tone of the monochrome image in accordance with the position of a point specified in the ink color circle or the ink color triangle, wherein

the ink color circle or the ink color triangle is configured to enable the color component intensities representing the three chromatic primary color inks to be visually recognized from the position in the ink color circle or the ink color triangle,

three vertices of the ink color triangle correspond to three chromatic primary colors of cyan, magenta, and yellow,

in a case where the color tone window includes the ink color circle, an arbitrary point in the ink color circle is mapped to a corresponding point in the ink color triangle which is a hypothetical equilateral triangle corresponding to the ink color circle,

the ink color triangle is an equilateral triangle having a common center with the ink color circle such that the color component intensities representing the three chromatic primary color inks at the corresponding point are determined in accordance with lengths of three lines drawn perpendicularly to three sides of the ink color triangle respectively from the corresponding point,

the ink color triangle circumscribes the ink color circle, ~~and~~

an arbitrary point in the ink color circle is mapped to a corresponding point in an inscribed circle of the ink color triangle, and

the corresponding point in the ink color triangle corresponding to an arbitrary point in the ink color circle is mapped such that the corresponding point is present on a straight line connecting the center of the ink color circle and the arbitrary point.

Claim 19 (Currently Amended): A computer program stored on a computer readable storage medium for use in setting a color tone of a monochrome image to be printed, the program causing a computer to realize the functions of:

displaying a color tone setting window for use in setting a color tone of a monochrome image, the color tone setting window including an ink color circle or an ink color triangle for specifying color component intensities representing three chromatic primary color inks with a single specified point; and

determining the color component intensities representing the three chromatic primary color inks as parameters defining the color tone of the monochrome image in accordance with the position of a point specified in the ink color circle or the ink color triangle, wherein

the ink color circle or the ink color triangle is configured to enable the color component intensities representing the three chromatic primary color inks to be visually recognized from the position in the ink color circle or the ink color triangle,

three vertices of the ink color triangle correspond to three chromatic primary colors of cyan, magenta, and yellow,

in a case where the color tone window includes the ink color circle, an arbitrary point in the ink color circle is mapped to a corresponding point in the ink color triangle which is a hypothetical equilateral triangle corresponding to the ink color circle,

the ink color triangle is an equilateral triangle having a common center with the ink color circle such that the color component intensities representing the three chromatic primary color inks at the corresponding point are determined in accordance with lengths of three lines drawn perpendicularly to three sides of the ink color triangle respectively from the corresponding point,

the ink color triangle circumscribes the ink color circle, ~~and~~

an arbitrary point in the ink color circle is mapped to a corresponding point in an inscribed circle of the ink color triangle, and

the corresponding point in the ink color triangle corresponding to an arbitrary point in the ink color circle is mapped such that the corresponding point is present on a straight line connecting the center of the ink color circle and the arbitrary point.